Rat Control in Alberta

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RAT CONTROL IN ALBERTA

by

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Alberta
AGRICULTURE
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RAT CONTROL IN ALBERTA

Foreword

No other rodent in the world is as widespread and destructive, and has so outwitted man in his efforts to exterminate it, as the rat.

Alberta was the only province or state on the North American continent considered to be rat-free prior to 1950, when a few rat colonies were discovered along the eastern border. The provincial government decided to try to stop the invasion and possibly stamp it out. The Department of Agriculture was made responsible for leading the campaign and other provincial and municipal agencies were asked to cooperate in the effort. The control program was organized to make the best use of existing knowledge and technology and to include the full cooperative effort of other government agencies and of the citizens of Alberta.

Thirty-two years later we can look with pride and satisfaction on the fact tnat Alberta is still basically rat-free. However, the price of continued freedom is continued vigilance. Rat control is everybody's job.

This bulletin deals briefly with the organization of the rat control program and the various means of controlling rats. It outlines how farmers and other property owners can prevent rat infestations, as well as how to cope with established rat colonies. With the continued support of all Alberta citizens, our province will remain rat-free.

H.B. McEwen

DEPUTY MINISTER

March 1983

RAT CONTROL IN ALBERTA
AN INTRODUCTION TO THE NORWAY RAT

The Norway rat, also sometimes called the house rat, brown rat or sewer rat, is one of the most destructive pests in North America and, indeed, the world. It settles wherever man resides and is a serious menance to:

Agriculture – On farms it consumes, contaminates and chews holes causing spillage of stored feed and grain. It eats fresh produce, eggs and live poultry.

Home – In towns and cities, it lives in basements, raiding the kitchen at night.

Industry – It destroys merchandise, woodwork and other materials, chews wires and causes fires.

Health – It contaminates food. The droppings, urine and hair of rats can transmit infectious jaundice, salmonella and other intestinal bacterial diseases and trichinosis (via pigs) to man.

Rats can also transmit bubonic plague (via fleas), rat-bite fever (via direct bites) and other diseases to domestic animals and man.

Rats reproduce at an amazing rate: a pair of rats may have one litter each month, with 10 or more per litter. Within 3-4 months, the offspring are ready to begin reproducing. Under ideal breeding conditions, one pair of rats could have 350,000,000 descendants in 3 years!

It rats were to become established throughout Alberta, the estimated annual loss would be over $40 million.

Figure 1. The Norway rat

THE RAT IN ALBERTA - A BRIEF HISTORY

Figure 2. The Norway rat (actual size)

The Norway rat is not native to North America, but gained entry probably as a stowaway with European settlers. Rats followed the westward movement of colonists, reaching the Great Lakes during the late 1800s and spreading across the Canadian prairie during the early 1900s. In the summer of 1950, the first recorded rat colony in Alberta was discovered on a farm near Alsask on the Saskatchewan border. Surveys by the provincial government revealed that colonization was occurring in the area between Empress and Consort. By 1952, 39 colonies had been found and the rat threat to Alberta was recognized as a reality.

The Department of Agriculture employed a rat exterminating firm to eradicate existing colonies and to prevent further infestation along the fourth meridian. This work commenced in June, 1952 and was completed in July, 1953. Arsenic powder was the main control chemical used. Over 140,000 lb of this rat contact powder were placed under all buildings where rats were present or could become established between Medicine Hat and Provost, an area 240 km (150 miles) long and up to 57 km (36 miles) wide. This included 2,700 farmsteads and over 8,000 buildings. The exterminators also dismantled many old buildings and ratproofed others.

This program was expensive, and arsenic use was dangerous to people and animals. Safer anticoagulant "warfarin" baits proved effective and became the main control poison used. In 1954, the Department of Agriculture initiated a municipal-provincial rat control program that is still in use today (see below.) Rat control legislation was passed and pest control officers appointed in every city, village, town and rural municipality in the province. Between 100-200 infestations were exterminated each year along the Alberta-Saskatchewan border during the 1960s, using warfarin bait. By the late 1970s, only 40-100 infestations were occurring annually. This program has succeeded in preventing the colonization by rats in Alberta to the present day.

Alberta is fortunate to be bounded on its north, south and west by rat-free areas. With the recent initiation of rat control programs in Saskatchewan and Manitoba, the task of defending the eastern border may be lighter in future years.

While overland migration is the major source of infestation in Alberta, a few rats enter via shipments of freight. Continued vigilance is necessary to spot and eradicate rats which enter in this way.

RAT IDENTIFICATION

The Norway rat is grey-brown on top and grey underneath. Its ears are small and its tail, which is round, tapered and scaly, is about 17 cm (7 in.) long. This is also the length of its body in natural pose. The largest male rat in Western Canada was about 0.57 kg (1.25 lb); most males top out at 0.45 kg (1 lb) maximum and females, 0.34 (0.75 lb) maximum.

Rats usually begin their activities after dark, unless their living conditions are very crowded; hence you may never see more than a dark profile at dusk. Tracks shown below in actual size may be your only clue for identification. The feet are quite dainty, which aids in track identification. Droppings are shiny and black when fresh, turning light brown when dry.

Figure 3. Left: Tracks and walking pattern of the Norway rat (actual size)
Right: Tracks and walking pattern of muskrat (actual size)

The laboratory rat is an albino Norway rat. Since these animals can live and reproduce successfully if they escape, it is illegal to have or keep them in Alberta. Only universities and senior public research institutions are allowed to keep laboratory rats, provided they are confined in escape-proof facilities.

If identification cannot be made, pest control officers should submit hair or fecal samples for laboratory identification to the Problem Wildlife Section, Alberta Environmental Centre, Vegreville, Alberta.

People often mistake similar species for Norway rats. Here are some similarities and differences to look for when attempting an identification:

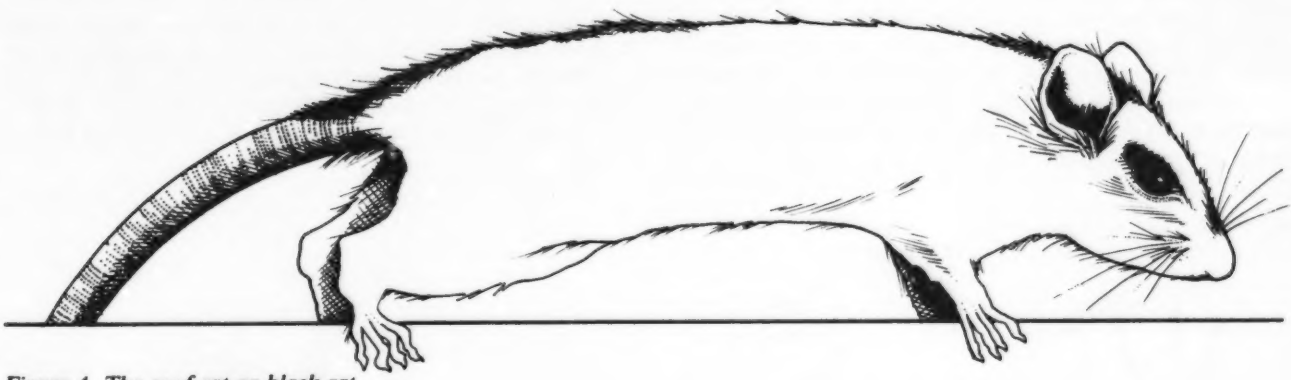

Figure 4. The roof rat or black rat

The **roof rat** (also known as the black rat) is sometimes introduced into the province with freight shipments. Slightly smaller than the Norway rat, it is darker in color and its tail is longer than its body. The roof rat usually lives in attics and the upper levels of buildings. It is common in seaports and coastal areas. Its destructive potential rivals that of the Norway rat. Trapping this species is preferred to baiting, as it can be difficult to find the individuals in the building after they have died.

Figure 5. The muskrat

The **muskrat** is sometimes mistaken for a rat when it wanders into town, as it often does during spring and fall dispersal. Unlike the quick, stealthy movements of the Norway rat, the muskrat's gait is more like a waddle. It is active during the daytime as well as at night. Muskrats are larger than rats with a body lengty of 25 cm (10 in.) and a tail of 22 cm (9 in.). Muskrats weigh up to about 1.4 kg (3 lb) and have longer fur and darker feet and tail. Their feet are relatively large, with coarse hairs between the toes which aid in swimming. Tracks differ considerably from those of Norway rats. The tail is dragged when moving which leaves a mark in soft ground. Note also that the hindfoot is larger than the forefoot.

Figure 6. The wood rat or pack rat

The **wood rat** or pack rat has large ears, long fur and a bushy tail. It builds large stick nests, often in caves, abandoned buildings, or on rocky ledges. Wood rats do not form colonies or cause agricultural damage, although they may damage interiors of buildings. In Alberta, they occur primarily in the foothills and mountains and the extreme southern edge of the province.

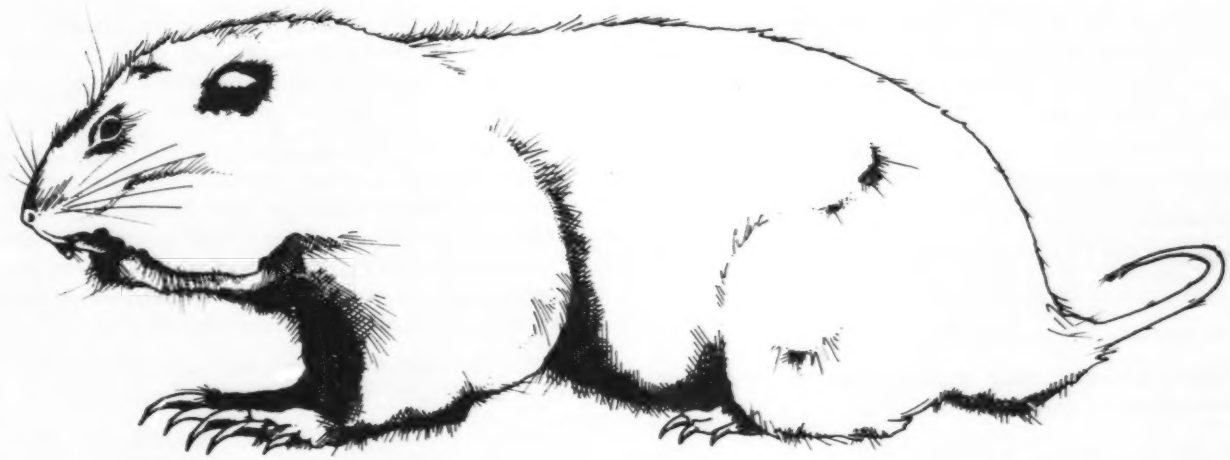

Figure 7. The pocket gopher

The **pocket gopher** is seldom seen, as it spends most of the time in underground burrows. It is misnamed a mole. (Moles are not found in Alberta.) The pocket gopher can be recognized by its blunt nose, silky brown fur, short tail and fur-lined cheek pouches. There may be white on the chin, throat and chest regions. Pocket gophers are approximately 22 cm (9 in.) long and weigh 0.15 kg (0.33 lb). They are vegetarian and do not inhabit buildings.

RAT CONTROL POLICY AND ADMINISTRATION

Under The Agricultural Pests Act, the Norway rat was officially designated a "pest" in 1951. As a result, it is the legal responsibility of every Albertan to prevent the establishment of Norway rats and to destroy all Norway rats on land or premises owned or occupied. Every city, town, village and rural municipality is required to appoint a pest control officer (PCO) to handle local rat control. Currently, there are over 250 part-time municipal PCOs in the province.

In the interior of the province, PCOs investigate reports of rat sightings by the public and supervise control action where needed. In the seven municipalities along the Alberta-Saskatchewan border, seven full-time rat control officers are employed, with salary and travel costs funded by Alberta Agriculture. These officers ensure maintenance of permanent bait stations on farms, in grain elevators and garbage dumps and supervise control measures.

The Rat Control Regulations under The Agricultural Pests Act provide for a supply of rodenticides by Alberta Agriculture to the municipalities along the Saskatchewan border. Municipal PCOs distribute these to residents for rat control. Approximately 10 tons of ready-mix poison bait are distributed annually in this buffer zone. This is enough bait to control an estimated 20,000 - 40,000 rats which annually invade the 600 km long border between Montana and Cold Lake, Alberta.

Probably 200, perhaps up to 1,000 rats invade Alberta annually. Each year 75 to 100 infestations are discovered, many of which are single rats while a few may involve up to 50 rats. The total number of rats destroyed annually is perhaps 2,000 maximum.

Rat Control Strategy

Alberta's success in staying rat-free since 1950 depends on three basic strategies:

1. An effective buffer zone along the eastern border to destroy all invading rats.
2. A network of provincial and municipal pest control officers across the province to spot and destroy any migrant rats that hitch-hike in with shipping or other means.
3. The continued enthusiastic and active support of all citizens to report animals thought to be rats, to destroy rats and provide encouragement for our rat-free status.

RAT CONTROL METHODS

Because of the rat's enormous reproductive capacity, controlling the spread of this species means totally eradicating it, plus year-round vigilance against new invasions. Sporadic clean-up campaigns are useless.

To be effective, a control program needs to incorporate four main lines of attack:

- elimination of rats
- elimination of food available to rats
- elimination of rat harborages
- rat-proofing of buildings and premises.

Obviously, these steps depend upon the year-round cooperation of everyone involved.

Eliminating Rats

Rodenticides – The most efficient way to eliminate either an established rat colony or the occasional migrating rat is by means of rat poison (rodenticide). A variety of rat poisons is currently available, all of which fall within one of the three basic categories: anticoagulants, acute poisons and fumigants.

Anticoagulants work by reducing the blood's clotting ability and causing gradual, painless death from internal bleeding. Most of these require repeated feedings for one to several weeks to remove an infestation.

Numerous anticoagulants are available today: Warfarin, Rozol (chlorophacinone), Diphacin (diphacinone), Pival (pindone), Sorexa (Warfarin with Vitamin D), Bromone (Maki; bromadiolone), Talon (brodifacoum) and Fumarin (coumafuryl). The latter three are the most recent and the fastest acting, requiring only a few feedings. However, they are also more toxic to other animals and man.

Since repeated feedings are necessary, anticoagulant bait must be of high quality and free of contaminants.

Alberta Agriculture supplies Warfarin or other anticoagulant bait to Pest Control Officers. (For directions on placement and use, see "Government-supplied bait".)

Epibloc (alphachlorohydrin), a new anticoagulant, causes sterility in male rats when consumed in a sublethal dose.

Acute poisons have various modes of action. Zinc phosphide is the only reliable one currently on the market. It is fast-acting and highly toxic to man and animals.

Fumigants are chemicals in the form of toxic gas. They are used for rat burrows under granaries or other structures, or in the ground. Of the five most commonly used – methyl bromide, chloropicrin, calcium cyanide, sulphur oxide and carbon monoxide, only the latter two can be used by persons who are not licensed applicators.

Government-Supplied Baits – Pest Control officers are supplied with ready-mix warfarin bait in two forms – dry and water baits. The dry bait consists of a plastic bag containing 0.5 kg (1 lb) of coarse rolled oats mixed with warfarin and icing sugar (a combination found to be the most acceptable to rats in Alberta). It can be placed unopened under floors, in garbage dumps, and in bale stacks (see "Placement of Bait").

The water bait, a tasteless, odorless salt of Warfarin dissolved in water, can be set out in a shallow dish next to the dry bait during non-freezing conditions. Water bait is especially effective where water is scarce. During freezing weather, the warfarin salt can be mixed with lard or margarine and is readily accepted by rats in this form.

Other rodenticides may be supplied by Alberta Agriculture for different situations.

RECOMMENDED RODENTICIDE USES

Location	Rodenticide	Who May Use in Alberta	Remarks
culverts, sewage basins	Warfarin, Rozol	anyone	Use bait stations
sewers	Diphacin	anyone	
houses	Rozol, Warfarin, Sorexa, Pival, Prolin, Fumarin	anyone	
	HCN (hydrogen cyanide)	lic. appl.	Do not treat again for 3-6 months
	methyl bromide	lic. appl.	
farmyards, tree nurseries, gardens, fields	HCN	lic. appl.	Dust pumped into burrow
	CO (carbon monoxide)	anyone	Engine exhaust (without CO emission control)
	sulphur oxide	anyone	Cartridge form for burning in burrow
grain (stored)	methyl bromide	lic. appl.	highly toxic gas
granary (empty) farm buildings	Rozol, Fumarin, Pival	anyone	
	Rozol, Fumarin, Pival, Warfarin, Prolin	anyone	
	Chloropicrin	lic. appl.	Keep away from feed, desirable plants and animals
	HCN	lic. appl.	Do not treat again for 3-6 months
	Zinc phosphide	lic. appl.	Keep all other animals out of baited area
food service & processing	Rozol, Diphacin Warfarin, Prolin, Sorexa, Pival, Fumarin	anyone	Use care not to contaminate food
	methyl bromide	lic. appl.	
garbage dumps	Rozol, Diphacin Fumarin, Pival, Warfarin, Prolin	anyone	Protect other wildlife by using bait stations accessible only to rats

Choice of Rodenticide – Rodenticides are most suited for certain situations. The chart on the preceding page lists the recommended rodenticides for each situation.

Use and Placements of Baits – Rats have a remarkable ability to associate taste, odor, or some quality of food with illness resulting from eating it. Thus they will become "bait shy" quickly if the bait is moldy or contaminated or if they have obtained a sublethal dose (enough to make them ill but not kill them). Baits should be checked regularly and replaced if damp, dirty or moldy. Rats are also wary of human scent on bait and containers. Gloves should be worn when preparing and setting out baits.

Dead rats should be collected daily and burned or well buried. If left on the ground, they may poison domestic or wild animals that find them (through secondary toxicity). Although rodenticides differ in their secondary toxicity, even the anticoagulants have been shown to possess this property. Feed domestic animals particularly well during rat baiting, so that they are not tempted to eat sick or dead rats or bait. Any sick rat sighted should be destroyed.

In deciding where to place the bait, look for the natural runs used by the rats. Rats are very cautious and travel against a backdrop (fence, wall, etc.). Place the bait along such routes of travel or use.

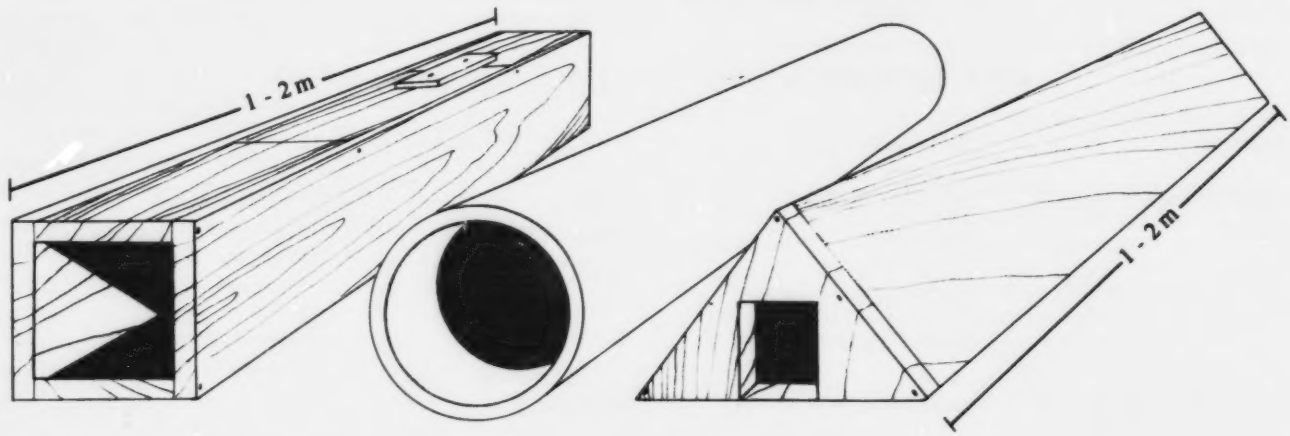

Figure 8. Samples of bait stations

A simple bait station can be made by leaning a wide board against a wall or fence. This will keep children and other animals out, as well as aid in attracting rats to the shelter thus created. Both ends of the bait station should be open, as rats prefer to have several avenues of escape. The ends of the entire bait stations may be enclosed with large-mesh chicken wire to keep poultry and other animals out while allowing rats and mice in. A bait station can also be made from boards or plywood 1.2-1.8 m (4-6 ft) long and 15-20 cm (6-8 in.) wide, from an old tire, or from hay bales.

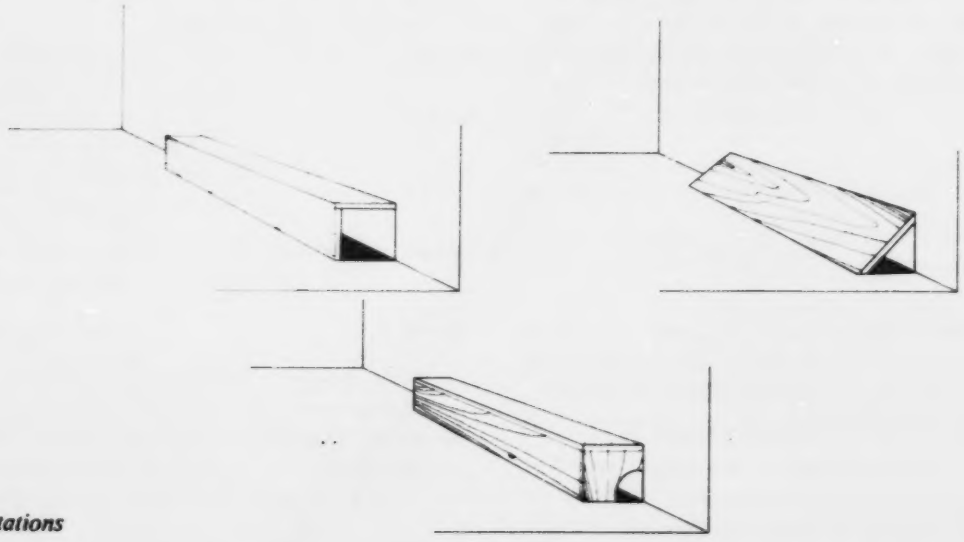

Figure 9. Bait stations

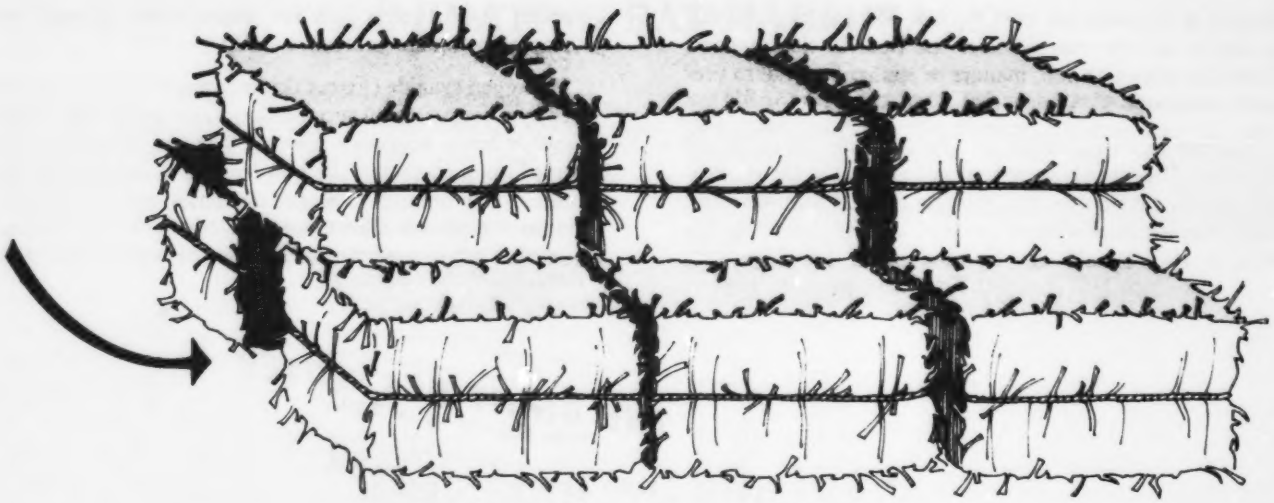

Figure 10. A bait station made from hay bales

If rats do not use the bait station within a few days, try scattering a few pieces of carrot nearby. Once they have begun feeding on the bait, it must not be allowed to run out for more than 24 hours. Since the size of the colony, and hence the amount of bait needed, is unknown at first, baits must be checked daily and more bait added if necessary. Once the amount needed has been determined, baits can be checked once a week. Lethal effects will require up to 2-3 weeks for Warfarin, Pival, Sorexa, Rozol and Diphacin. Continue supplying bait until feeding has ceased and no further rat signs are seen. Keep a few permanent stations baited to catch stragglers and migrating rats.

A change of poison, trapping (see "Trapping" below), or some other method may be necessary to catch the last few rats, which are generally the large wise, mature ones. If they are not eliminated, the population will build up again.

Baiting Feed Stacks – Feed stacks of bundles or bales provide excellent winter shelter for rats; baled oats or other grain provide a food supply as well. With drifted snow hiding all signs of infestation, the colony may go undiscovered until spring, when lower stack layers are reached and the colony has grown large. The rats will then disperse to new sites if disturbed.

This situation can be prevented by careful placement of unopened, 0.5 kg (1 lb) plastic bags of ready-mixed warfarin at ground level as the stack is being built. Place bait bags every 7 m (20 ft) just inside the stack margin. Leave a small space higher up through which you can observe the bait periodically throughout the winter. This inspection is important. Migrant rats entering the stack will quickly find the bait, which should not be allowed to run out.

There is little danger to livestock from small amounts of spilled warfarin in the feed or on the ground. There is some possible danger to poultry or cats which frequent the stack. For this reason all holes through which they might enter should be plugged.

Stacks which are not baited at the time of construction can be baited by removing an outside bale or bundle near the ground every 7 m (20 ft) around the edge. After putting the bait inside, close the hole to keep out light, snow and domestic animals. Unused bait packs can be salvaged for later use.

FUMIGATION

Fumigation can be used for burrows or under floors of out-buildings (not dwellings), where gas concentrations can build up. For the inexperienced user, car exhaust is a relatively safe and easy means of fumigating, using an older model vehicle (without CO emission control) or tractor.

For large fumigation jobs use large hoses – as used in garages for exhaust. Block exit holes with soil. Use at least a 5 cm (2 in.) hose connected to the exhaust pipe by means of short connecting hoses such as radiator hose. Run the engine for about 10 minutes at fast idle with part choke.

Repeat the process for each burrow. Both empty and full granaries can be treated under the floor in this manner. Bank the sides with soil, manure or similar material to prevent gas escape.

Sulphur oxide cartridges are also available for use in rat burrows. They should be lighted and inserted as far as possible into the rat burrow, and the hole plugged with dirt. Any adult may use these without a licence. Beause of possible fire hazard, they should not be used under buildings with wooden floors, unless they are placed within a length of stovepipe or similar protective shield.

Hydrogen cyanide (from calcium cyanide powder) can be used by a licensed applicator outdoors and away from buildings that house people or animals. The very poisonous gas formed upon contact of the powder with moisture kills rats within a few minutes. The gas dissipates and the cyanide powder remains as a nonpoisonous residue in the treated burrows. Only trained, licensed applicators may use this gas.

Figure 11. Sulphur oxide cartridges

TRAPPING

Trapping rats is useful in two circumstances. One is when definite identification is needed before a poisoning program is begun. In this case, leg-hold traps No. 0 or No. 1 should be used. The second is at the end of a poisoning program, when a few bait-shy individuals may still be present. Snap traps (weasel size) are the easiest for this occasion. If pets are present live animal traps may be preferred in either situation, or traps can be put in an enclosed space to which pets would not have access.

Rats shun open spaces and always travel behind an object leaning against a wall. Such places make good trap sites. Trap placement is a more important factor in successful trapping than is choice of bait – in a good site, no bait is required.

Baits that can be used include peanut butter, nuts, bacon, fish or other meat, as long as it is fresh. Tie the bait firmly to the trigger. If using a leg-hold trap, secure it to the floor or other object so it is not dragged away. A snap trap that is not baited should have cheesecloth or other light-weight materials placed over the trigger pan to hide it.

Traps that have held rats previously should be scalded with boiling water. Remember, mature rats are aware of much that is going on in their environment.

ELIMINATING FOOD SOURCES

Rats do not range widely; they settle close to their food supply. If there is no food available, they are less likely to move in. Open garbage and trash piles must be eliminated on the farm as well as in town. Cover garbage containers with tight-fitting lids. If trash burning is not allowed, trash should be buried about 1 m (3 ft) under the ground, and the soil compacted.

Farm grain and livestock feed are important sources of rat food. Spilled feed should be cleaned up. Feed bins, granaries, feed troughs, and other storage areas should be rat-proofed (see "Eliminating Rat Harborages" below).

ELIMINATING RAT HARBORAGES

The Norway rat can live undergound, beneath stored materials, within double walls, or in other enclosed spaces. Along with a poisoning program, all such harborages must be eliminated.

Since rats dislike light, stored materials both indoors and outdoors and outside should be placed on stands at least 45 cm (18 in.) off the ground. This includes lumber piles, fence post piles – anything that provides a hiding place for rats. Burrows should be broken up and trash piles removed. Spaces where rats can hide should be either sealed permanently or ripped out. Mow grass and weeds to eliminate cover.

RAT-PROOFING BUILDINGS

Once most of the rats have been destroyed and their shelter eliminated, buildings should be rat-proofed to prevent re-infestation. Small sheds and granaries on skids should be raised to at least 45 cm (18 in.) above ground. This will allow light, which rats dislike, and access by dogs, cats and other predators. Door and window edges should be repaired if not tight and fitted with metal edges. For larger buildings, old flooring should be taken up, underlain with compacted gravel or cinders, and replaced directly on top of this material. Treating wood floors and other rat-susceptible structures with creosote or anthracene oil (carbolineum) will also help deter rats. Concrete floors are best.

Use 45 cm (18 in.) strips of galvanized sheet metal or metal screening under the inside wall lining. Metal screening of 12 mm (0.5 in.) mesh or less should be placed over vents and openings near the ground. Add lime to the insulation if possible.

When planning new buildings, have the concrete foundations extend at least 60 m (2 ft) below ground and 45 cm (18 in.) above ground. Openings for drains, utility lines and pipes should be tightly sealed. Rats can squeeze through any opening greater than 12 mm (0.5 in.); use metal screening of 12 mm mesh or less on all openings (3 mm if mouse proofing is desired). Use 26-gauge metal sheeting to protect door edges and other chewable points of entry. Fill double walls with either brick or concrete to a height of 25 cm (10 in.) above the sill. Vents should be covered with wire screens.

A wire wall may be constructed to keep rats out of an area if the population is small. The wire must be of a quality better than topgrade hardware cloth, with 12 mm or smaller mesh. Place it at least 60 cm (2 ft) into the ground in the form of an L, with 30 cm (1 ft) extending outward (see diagram). The top of the wire should extend about 30 cm (1 ft) above ground and then bend out and down again.

Some rats are "smart", or so it seems. But with persistent effort, anyone – homeowner, farmer, pest control officer – can eradicate a rat colony. It takes patience and the ability to follow the rules. There are few rat-free places in the world. Let's keep Alberta one of them.

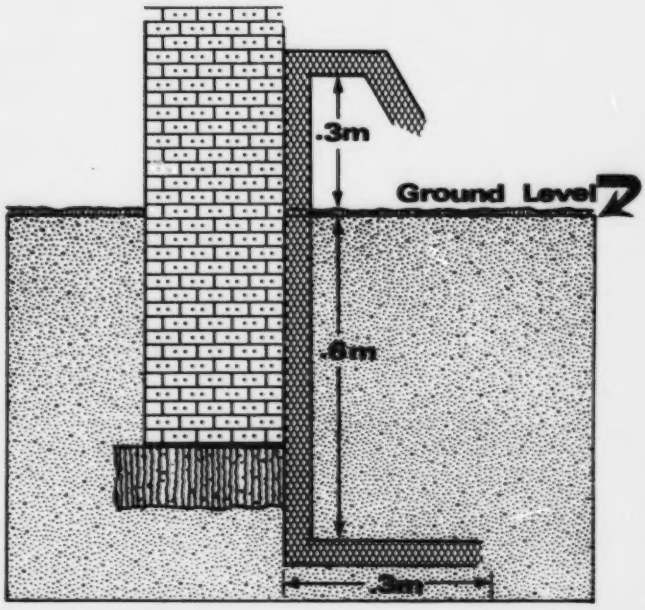

Figure 12. A rat-proof wire wall will help keep rats out of new buildings

IN CASE OF ACCIDENTAL POISONING

The first aid procedures recommended for accidental poisoning owing to spillage or swallowing of a rat poison or inhaling vapors of a fumigant are given below. ALWAYS CALL A DOCTOR FIRST. Tell him the name of the poison. If taking the patient to a hospital, take the container of poison if possible or its entire label.

Anticoagulants: Warfarin, Pival, Sorexa, Rozol, Diphacin, Fumarin, Bromone, Maki (bromodiolone)

These are not harmful to man unless swallowed in a large quantity. If this occurs, give the patient 1 or 2 glasses of water and cause vomiting by inserting finger down throat; repeat until vomit fluid is clear. DO NOT cause vomiting if patient if unconscious or in convulsions. If spilled on the skin, remove contaminated clothing and wash the skin well with soap and water. If in the eyes, flush with water 5-10 minutes and obtain medical help.

Talon (brodifacoum) - If swallowed, call a doctor at once. Read the label.

Zinc Phosphide - If on the skin wash thoroughly. If swallowed, call a doctor and cause vomiting with salt or mustard water. Have the patient lie down and keep warm.

Fumigants: Hydrogen cyanide gas (from calcium cyanide), chloropicrin, methyl bromide)

The following should be done for any of these:

If inhaled: get the patient to fresh air. Call a doctor. Remove clothing that is contaminated. Keep the patient warm. Watch breathing and give artificial respiration if it stops. If skin contact: immediately remove contaminated clothing (including shoes, bandages.) Wash skin well with soap and water. If irritation develops, get medical attention.